1884996

Site Name:	**LOWRY LANDFILL**	**EPA ID No.:**	**COD980499248**
Interviewer Name:	**Katherine Jenkins**	**Affiliation:**	**EPA**
Subject Name:	**Lee Pivonka, Wendy Naugle, Jeannine Natterman and Doug Jamison**	**Affiliation:**	**Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the Division)**

Subject Contact Information:
Time: **Date:** **11/18/2016**
Interview Location:

Interview Format (circle one): **In Person** **Phone** **Mail** **Other: Email**

Interview Category: **Potentially Responsible Parties (PRPs)**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   The Division's overall impression of the project is that:

   a) with regard to "cleanup" the remedy for Operable Unit 1 (OU1) and OU6 still does not meet performance standards and the Division has concerns about remedy effectiveness;

   b) with regard to maintenance, the remedial systems at the site are operated and maintained in the manner required by EPA; and

   c) with regard to reuse, the Division is unaware of any reuse activities at the Site.

2. What is your assessment of the current performance of the remedy in place at the Site?

   The remedies for OUs 2 through 5 (Landfill Solids, Landfill Gas, Soil, and Surface Water and Sediments, respectively) appear effective, with ongoing maintenance and operation, and they are protective in both the short- and long-terms. This assessment is consistent with the Division's positions during the past two five-year reviews (CDPHE, 2007 and 2012).

   In contrast, the remedy for OU1 (Shallow Groundwater and Shallow Subsurface Liquids) and OU6 (Deep Groundwater) appears ineffective and its long-term protectiveness may be compromised. The OU1 and OU6 remedy has failed to achieve the Remedial Action Objectives (RAOs) after more than three decades of active groundwater extraction operations. This assessment of remedy performance is consistent with the Division's positions during the past two five-year reviews and with other documents and/or comments submitted to EPA. (See CDPHE, 2003, 2007, 2012, 2015a, 2015b and CDPHE and EPA, 2007).

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   Yes. Recent examples of complaints/inquiries from residents include, but are not limited to CLLEAN correspondence to EPA (CLLEAN, 2016a and 2016b). CLLEAN has also provided multiple technical white papers to EPA during the past four years, that include complaints and inquiries about remedial activities at the site. The Honorable Rod Bockenfeld (Arapahoe County Commissioner) has also inquired about remedial activities at the Site and the ongoing technical disagreements regarding the OU1 and OU6 remedy effectiveness.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

   Yes. The Division conducted an independent analysis of site-specific factors influencing groundwater containment remedy effectiveness because of concerns about the on-going persistence of groundwater contamination beyond the point of compliance. This analysis is summarized in a white paper titled "Groundwater Containment Remedy Technical Considerations" dated February 2015 (CDPHE, 2015a). The white paper includes multiple conclusions and recommendations. The primary issues identified during this review are as follows:

- A structural feature has been identified north of the site that is likely continuous both north and south of where it was identified. The growth fault represents a possible mechanism for contaminant transport beyond the point of compliance.
- Two predominant hydraulic gradients prevail at the Site, northward and downward. A three-dimensional analysis of hydraulic gradients and conductivities demonstrates that the nominal resultant groundwater flow vector is northward and 20 degrees downward. Data collection and analysis in three dimensions is critical to properly assessing remedy effectiveness and attainment of remedial action objectives.
- The conceptual site model for the Site should be updated to reflect the complex interrelationships between geology and groundwater contaminant migration.
- The remedy does not appear to completely capture and contain the groundwater contaminant plume. Supplemental actions taken north of the point of compliance have been unsuccessful in fully eliminating what was considered to be residual contamination of limited extent.
- The injection of potable water near point of compliance wells interferes with the evaluation of remedy effectiveness and increases the volume and mobility of the off-site groundwater contaminant plume.

The Groundwater Monitoring Plan (GWMP) is still in need of revision. Subsequent to the Division's 2015 white paper, the GWMP was revised, however, the changes did not address many of the fundamental problems identified by the Division, both in the white paper and in comments on the GWMP itself (CDPHE, 2015b). The plan does not comply with EPA's 2008 Guidance "A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems" and does not allow for the unbiased evaluation of remedy effectiveness compared to performance standards.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   Yes. Colorado Basic Standards for Groundwater, Regulation 41 has been amended several times since the March 22, 2005 version currently utilized as a basis for "Site Wide Groundwater Performance Standards" as depicted in Table 1 of the Revised Monitoring Plan, dated July 13, 2015 (EMSI in association with Parsons, 2015).

   Specifically, Regulation 41 was amended in January 2008, October 2009, September 2012 and May 2016. The most recent version has an effective date of June 30. 2016 and can be located at:

   https://www.colorado.gov/pacific/sites/default/files/41_2016%2806%29hdr.pdf

   Specific standards in need of revision are as follows (please refer to Regulation 41 for an explanation of the ranges of values in the standards):

- 1,1,1-Tichloroethane should be 14,000 or 200 micrograms per liter (µg/L)
- 1,2-Dibromethane should be 0.018 µg/L
- Acetone should be 6,300 µg/L

- Arsenic should be 10 µg/L
- Biphenyl should be added with a standard of 4.4 µg/L*
- Gross Alpha should be 15 picocuries per liter (pCi/L)
- Aroclor, 1260 should be 0.0175 to 0.5 µg/L
- Carbon Tetrachloride should be 0.5 to 5 µg/L
- cis,1,2-Dichloroethene should be 14 to 70 µg/L
- Coliform, should be expressed as "Coliform (total)" (not Coliform (total)/100 ml) and the units should be "organisms per 100 ml" the correct standard is 2.2
- Methanol should be added with a standard of 14,000 µg/L*
- Methylene Chloride should be 5.6 or 5 µg/L
- Pentachlorophenol should be 0.088 to 1.0 µg/L
- Phenol should be 2,100 µg/L
- Tetrachloroethene should be 17 or 5 µg/L
- Tetrahydrofuran should be added, with a standard at 6,300 µg/L*
- Thorium 230 and 232 have a combined standard of 60 pCi/L, not separate standards, as is currently indicated
- Toluene should be 560 to 1000 µg/L
- Trans-1,2-Dicholoroethene should be 140 or 100 µg/L

  The chemical Bis (2-Chloroethyl) Ether is listed on Table 1 in the monitoring plan. This chemical name is sometimes synonymous with Bis (chloromethyl) ether (BCME). Both chemicals are listed in Regulation 41 with different CAS numbers and different groundwater standards. We are uncertain which chemical is referred to in the monitoring plan, so we cannot determine which standard is applicable. It would be very helpful if the monitoring plan were to also identify contaminants of concern using CAS numbers. EPA should confirm which chemical is a COC at the site and then verify that the correct value from Regulation 41 is being applied.

  *new contaminants that were added to Regulation 41 in 2016. It is possible that there are other standards in Regulation 41 that have been added since 1994 that we have missed in this review. We encourage EPA to conduct a comprehensive review of the groundwater and surface water standards to determine if all standards currently being used at the site for OUs 1, 5, and 6 are up to date.

  The final issue is that standards being applied at the site are not always the actual ARAR from the regulation. In some cases, a reporting limit or background value was applied in lieu of the actual standard. The basis for these decisions, some of which were made many years ago, should be reviewed for both representativeness and protectiveness in the context of this Five-Year Review. For example, performance standards that were established based on a reporting limit in 2005 may not be protective given improvements in analytical methods in the past 10 years. In addition, performance standards that were established using background data, should also be revisited if there is a possibility that the original data used to represent background were not appropriate (for example, the Division has long argued that use of downgradient well data to establish background is inappropriate).

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

No. The environmental covenant (HMCOV0016) that is the primary Institutional Control for the site covers only the site itself. Since there is a substantial off-site groundwater contaminant plume that has NO institutional controls, the ICs for the site are inadequate and not protective. ICs should be extended to include all areas where groundwater contaminant concentrations exceed ARARs or applicable standards

7. Are you aware of any changes in projected land use(s) at the Site?

   No. Although the Division is aware of some changes and future possible changes in land uses adjacent to the Site, the Division is unaware of any changes in projected land use(s) at the Site, proper.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   Yes. Please see the response to Question 4, above, in addition, we recommend reading the Division's White Paper (CDPHE, 2015a) and the Division's comments on the 2014 draft Groundwater Monitoring Plan (CDPHE, 2015b) in their entirety.

9. Question A: Is the remedy functioning as intended by the decision document?

   No (OU1 and OU6).

   Yes (OUs 2 through 5).

   The OU1 and OU6 remedy is not functioning as intended because the RAOs have not been achieved after more than three decades of continuous operation and supplemental actions taken north of the point of compliance have been unsuccessful in fully eliminating what was considered to be residual contamination of limited extent.

10. Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

    No. The exposure assumptions, toxicity data, cleanup levels/performance standards for OUs 1 and 6 contaminants have changed since the last five-year review in 2012.

    With regard to exposure assumptions, it was previously assumed that the off-site groundwater plume posed no risk because there were no known completed exposure pathways. This assumption is no longer valid as shallow privately owned drinking water wells have been identified near the off-site contaminant plume.

    It is very important to note that each EPA Five-Year Review provides an inventory of privately owned wells within a 1-mile radius of the site, which makes no sense when groundwater contamination is currently monitored at least three (3) miles downgradient of the site. In order to fully determine protectiveness of the remedy with regard to potential off-site private wells, the well inventory radius MUST be expanded based on site-specific conditions. For example, 1-mile from the down-gradient terminus of the plume, would be more appropriate. If this analysis had been conducted correctly during the last Five-Year Review, private wells potentially impacted by the plume would have been identified and sampled in a timely manner.

Changes in toxicity data have resulted in modification of the State's Basic Standards for Groundwater, as indicated in response to question 3 above. However, it is unclear how these changes to the standards may impact protectiveness at the site. In particular, it is important to note that many of these contaminants of concern are no longer monitored at the site. Therefore, there may be no data available to compare to the updated standards.

Most importantly, since the full extent of the off-site groundwater contaminant plume has not been defined in a comprehensive synchronous sampling event, at an appropriate PQL, it is impossible to know where the plume boundaries are in relation to off-site private wells, especially in three dimensions.

Yes. The RAOs for OUs 1 and 6 remain valid.

11. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

    Yes. With respect to the OU1 and OU6 remedy, two types of new information have become available since the last Five-Year Review as follows:

- In April 2014, CLLEAN provided the Division and EPA with information regarding the location of shallow off-site privately owned wells; and
- In 2015 the Division provided its white paper to EPA (CDPHE, 2015a). The white paper contains new information regarding a growth fault north of the site, in addition to other important technical observations regarding remedy effectiveness.

References Cited

CDPHE, 2015a: Colorado Department of Public Health and Colorado Environment, Hazardous Materials and Waste Management Division, 2015a. Groundwater Containment Remedy Technical Considerations, Lowry Landfill Superfund Site, Arapahoe Colorado, February 2015, Final, also known as "the Division white paper."

CDPHE, 2015b: Colorado Department of Public Health and Colorado Environment, Hazardous Materials and Waste Management Division, 2015b. CDPHE Comments to EPA dated February 5, 2015 on the "August ##, 2014" document entitled "Revised Groundwater Monitoring Plan," Lowry Landfill Superfund Site, Arapahoe County, Colorado.

CDPHE, 2012: Colorado Department of Public Health and Colorado Environment, Hazardous Materials and Waste Management Division, 2012. CDPHE Comments to EPA on the Draft Third Five-Year Review Report, Lowry Landfill Superfund Site, provided as 7 to EPA, 2012

CDPHE, 2007: Colorado Department of Public Health and Colorado Environment, Hazardous Materials and Waste Management Division, 2007. CDPHE Comments to EPA on the November 3, 2006 Draft Second Five-Year Review Report, Lowry Landfill Superfund Site, provided as Attachment 3 to EPA, 2007

CDPHE, 2003: Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division, 2003. Lineaments at Lowry Landfill Superfund Site? identifying the Division's lineament hypothesis as it may relate to groundwater monitoring and containment at Lowry Landfill Superfund Site, Preliminary Draft: January 24, 2003.

CDPHE and EPA, 2007: Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division and the Environmental Protection Agency (EPA), Region VIII, 2007: Powerpoint presentation entitled “Lowry Landfill North End 1,4-Dioxane Plume” provided as part of Attachment 1 to CDPHE, 2015b.

CLLEAN, 2016a: Citizens for Lowry Landfill Environmental Action Now (CLLEAN), 2016a. Letter to Mr. Shaun McGrath, Regional Administrator EPA Region 8 and Mr. Martin Hestmark Assistant Regional Administrator of Ecosystems regarding “EPA Region Oversight of the Lowry Landfill Superfund Site,” dated September 12, 2016.

CLLEAN, 2016b: Citizens for Lowry Landfill Environmental Action Now (CLLEAN), 2016b. Response to Martin Hestmark, EPA Region 8 Assistant Regional Administrator, CLLEAN letter dated September 12, 2016 – EPA Region 8 Oversight of the Lowry Landfill Superfund Site, dated October 13, 2016.

EMSI in association with Parsons, 2015: Engineering Management Support, Inc. in association with Parsons, 2015. Revised Groundwater Monitoring Plan, Lowry Landfill Superfund Site, dated July 13, 2015 and approved by EPA on July 21, 2015.